D. FOLSOM

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SOME FACTORS IMPORTANT TO SUCCESSFUL POTATO STORAGE

R. C. Wright, Office of Horticulture, U. S. Dept. of Agriculture

Much has been written concerning the storage of potatoes, much has been repeated and much, due to its importance, should be repeated that it may be kept constantly before the minds of those interested in the profitable storage of potatoes. The first essential in the successful storage of potatoes is good stock, free from disease, mechanical injury and excess dirt. By adequate inspection diseased stock may be eliminated both in the field and after digging. This point now seems to be fairly well recognized by potato storage interests. The next point, mechanical injury, however, seems not to be generally taken by the potato industry, and perhaps more stress should be placed upon it. Mechanical injury usually can be avoided with care. To start with, potatoes should be as mature as reasonably possible before digging if they are to be stored. The skin of immature potatoes rubs off more readily than on mature ones when being dug. Skinned potatoes are more susceptible to storage disease infection; also shrinkage, while in storage is likely to be greateer. Other conditions being equal skinned potatoes are less attractive and therefore less salable due to their ragged appearance. Well matured potatoes also skin more or less readily unless carefully handled. The digging operation should be carried on in such a way as to avoid dropping, bruising or rubbing as much as possible. The tubers should be picked up if possible into the containers in which they are to be conveyed to the storage in order to eliminate all unnecessary handling. Bags should not be used for this purpose since it is almost impossible to handle them without badly skinning the potatoes. All rough handling such as dropping or throwing potatoes into containers and careless handling of the containers themselves should be discouraged. In emptying the potatoes into the bins the practises of pouring them out from a distance above the pile or of working

from a plank layed directly upon the potatoes in the bin, or even in extreme cases of walking upon the potatoes themselves are not conducive to the good keeping of potatoes. The working planks can and should be supported just above the top of the pile and the potatoes carefully poured out without dropping.

Conditioning

Whenever practicable it is desirable that potatoes be conditioned or cured under proper conditions before going into permanent storage where the temperature is around 40° F or lower. This is to allow the bruised or skinned surfaces to heal or suberize over. Considerable investigational work has been carried on by Priestly and Woffenden in which a study was made of the conditions under which the healing process in potatoes is accomplished. They have shown that in a warm moist atmosphere with a normal amount of oxygen present a suberin layer is formed in about 24 to 48 hours at the surface of the wound by the oxidation and condensation of escaped sap. This suberin layer forms more completely in moist atmosphere than in dry and in darkness than in sunlight. A microscopic examination shows this formation to be about the walls of the individual plant cells near the surface. A few days later, 24 to 60 hours depending on the temperature, below this suberin deposit a cork phellogen layer is formed as the result of an active cell division apparently caused by the accumulation of sap behind the suberin deposit on the surface which has blocked its escape. Shapovalov and Edson have shown that cut surfaces of potato seed pieces in a moist atmosphere of 68° F. suberized sufficiently in 12 hours to prevent the penetration of B. Phytophthora. Hawkins and Harvey found no penetration of Phthium debaryanum in potatoes when held at 86 degrees F. and inoculated after 3 hours. From the results of the workers mentioned and others it is to be concluded that where possible it is of advantage to allow potatoes to remain under favorable conditions for the wounded surfaces which will occur to some extent under the most ideal conditions to heal over and to permit immature tubers to mature and harden up. Potatoes put immediately after digging into temperatures ranging from 32° to 36° F. have been noted to show signs of severe injury where the skin has been rubbed off. Badly skinned immature potatoes stored at 40° F. within a day after digging have in some cases shown severe shriveling and darkening of skinned areas since proper suberization seems not to be active at this temperature.

Best Storage Temperature

The average freezing point of most varieties of potatoes is around 29° F. Therefore potatoes should be stored where the temperature will not get below this point or they will be in danger of freezing injury. Under average conditions a temperature of from 38° to 40° F. is perhaps the best storage temperature. With-

in this range germination is practically suspended although after 6 or 7 months at 40° F. storage most varieties show very short sprouts which, however, seem never to grow longer than mere stubs. Potatoes stored at temperatures ranging up to 70° F. where sufficient humidity is present to prevent shriveling apparently keep well but their natural rest and dormant periods are more quickly passed through and active germination takes place. It seems safe to say that potatoes, if held under favorable conditions of humidity and ventilation may be stored for 2 months or even 3 months with some varieties at temperatures up to 70° F. after digging without germination. At temperatures below the range of 38 to 40° F. potatoes will remain dormant indefinitely, however, when stored at temperatures below 40° F. there is found an increased accumulation of sugar rendering them rather unpalatable to some persons for food. This excess of sugar can readily be removed however by raising the storage temperature to 40° F. or above for one to three weeks, the rapidity of the decrease depending on the temperature. Illustrating the accumulation of sugar in potatoes when stored at low temperatures the results of the following experiment are given. Lots of Irish Cobbler potatoes were simultaneously put in storage at 32, 36, 40, 50, 60 and 70° F. on November 5. Samples consisting of 12 specimens from each temperature were taken for sugar analysis about a month apart from November 5 until March 24th. The results of the analysis calculated on the green weight basis are given in Table I. These

TABLE I.

Progressive Change in Sugar Content of Irish Cobbler Potatoes while in Storage at 32, 36, 40, 50, 60, and 70 degrees F.

Storage Temperature	32°			36°			40°		
Sugar-calculated as Dextrose	Dextrose %	Sucrose %	Total Sugar %	Dextrose %	Sucrose %	Total Sugar %	Dextrose %	Sucrose %	Total Sugar %
Nov. 5(start)	1.035	0.335	1.370	1.035	0.335	1.370	1.035	0.335	1.370
Nov. 26	2.485	2.335	4.820	2.285	1.465	3.750	1.860	0.360	2.220
Dec. 17	3.930	1.205	5.135	2.485	1.335	3.820	2.010	0.360	2.370
Feb. 5	5.165	1.420	6.585	3.110	1.100	4.210	1.520	0.315	1.835
Mar. 24	4.920	2.170	7.090	3.230	1.560	4.790	1.820	0.350	2.170

	50°			60°			70°		
Sugar-calculated as Dextrose	Dextrose %	Sucrose %	Total Sugar %	Dextrose %	Sucrose %	Total Sugar %	Dextrose %	Sucrose %	Total Sugar %
Nov. 5(start)	1.035	0.335	1.370	1.035	0.335	1.370	1.035	0.335	1.370
Nov. 26	1.130	0.280	1.410	0.755	0.315	1.070	0.945	0.250	1.195
Dec. 17	1.130	0.240	1.370	0.825	0.225	1.050	0.740	0.220	0.960
Feb. 5	0.885	0.245	1.130	0.565	0.180	0.745	0.365	0.275	0.640
Mar. 24	1.685	0.190	1.875	Sprouting			Sprouting		

results show a steady increase in sugar at 32° storage throughout the experiment. At 36° the increase was not so great as at 32° while at 40° the increase was only slight. At 50 there was practically no change and at 60° to 70° the sugar decreased. At the close of this experiment a quantity of the potatoes from 32° storage were put into 60° storage and thereafter sampled every few days to show the progress of the decrease of the sugar content. The results are shown in Table II. In about 17 days the sugar content of these potatoes was reduced to near what would be expected in potatoes stored at 40° F.

TABLE II

Reduction in Sugar Content of Irish Cobbler Potatoes after Removal from 32° Storage to 60° Storage

Sugar—calculated Dextrose		Dextrose %	Succrose %	Total Sugar %
Mar. 24 (start)		4.92	2.17	7.09
Mar. 28	4 d.	4.06	1.27	5.33
Mar. 30	6 d.	3.55	0.97	4.52
Apr. 2	9	2.82	0.77	3.59
Apr. 6	13	2.14	1.52	3.66
Apr. 10	17	2.04	0.36	2.40
Apr. 17	24	1.81	0.37	2.18

Humidity and Ventilation

The humidity in a potato storage should be comparatively high to prevent shrinkage due to loss of water from the potatoes which takes place if the air in the storage is dry. A relative humidity of 90% to 95% is frequently found. Such a high humidity is not undesirable provided there is no condensation of moisture on the walls and partitions or on the potatoes themselves. If the potatoes become wet, mold growth readily develops. The most desirable relative humidity perhaps would be from 85% to 90%, as there will be very little shrinkage and little liability of condensation under ordinary conditions. The amount of ventilation necessary for successful potato storage is at present a mooted question. It is claimed by some that ventilation hastens and by some that it delays germination. It seems best to advocate such a control of ventilation to keep the storage temperaturee as near 38° to 40° as possible and to keep the relative humidity around 85% to 90%. To maintain these conditions some study of each particular situation is necessary. During quite mild weather ventilation is usually practised at night to take advantage of the cooler air at that time. Special care should be taken not to open the storage at any time when the outside temperature is higher than that of the air inside the storage or that of the potatoes themselves because fog and condensation within the storage will result, often causing water to accumulate on the overhead structures and drip onto the potatoes

or even condense on the potatoes. This often happens during a warm humid period followng a severe cold spell.

Storage Houses

The ideal storage house should be frostproof against ordinary winter weather. In the northern latitudes provision should be made for heating during severe weather as this proves cheaper than the additional expense in construction necessary to insulate against extreme conditions. The roof should be insulated as well as the side walls to prevent condensation from dripping onto the potatoes. A well constructed, well insulated storage house furnishes protection against both cold and heat and helps maintain a uniform temperature. The storage bins should be provided with false floors supported at least 6 inches above the main floor and double wall partitions with two to four inches air spaces betweeen to permit air circulation around the potatoes. The boards on the false floor and partitions should be placed with one half to one inch air spaces between. Bins should not be constructed to hold more than one car load of about 600 bushels. A good practise when filling the bins is to place near the center one or two removable vertical air ducts about 1x1 ft. inside dimensions constructed with slat sides with 1 inch air spaces between and extending to the top of the bin. These ducts allow air circulation from the center of the mass of potatoes. All light should be excluded from the potato house.

Th equipment of a commercial potato house is not complete until at least two good thermometers are installed one near the center and one near the coldest side of the house. Beside these thermometers should be tacked a chart of some sort where daily or better twice daily temperature readings are recorded.

JOURNAL AIDS IN INTERNATIONAL FRIENDSHIP

The American Potato Journal has made a good start under comparative unfavorable financial conditions. I hope it will continue to prosper and will help the farmer thruout the world and at the same time aiding in friendly cooperation between the nations.—**H. W. Wollenweber, Berlin-Dahlem, Germany, Aug. 15.**

"Errata" in vol. IV, No. 4, April, 1927

page 47, line 23 and 24: Dr. H. Wollenweber, Berlin-Dahlem, Germany has been given here as the author of the abstract of Donald Folsom's paper by mistake page 48, line 42 add behind "of" the words "xanthin to lower oxydised nuclein bases. He mentions the"

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PROGRAM FOR NEXT ANNUAL MEETING

The Annual Meeting of the Potato Association of America will be held on December 28, 29 and 30 at Nashville, Tenn. The program committee consisting of H. C. Moore, chairman, East Lansing, Mich.; E. V. Hardenburg, Ithaca, N. Y.; Walter M. Peacock, Takoma Park, D. C. and W. Stuart, Washington, D. C. are working on the program for this meeting. Dr. Burton E Livingston, Permanent Secretary of the American Association for the Advancement of Science and Associated Societies has requested a copy of our program by the first of October so that it could be given proper advertisement along with programs from other organizations. This is a rather short notice but none too early to start the ball rolling.

Those who have papers to present at the meeting should send in the titles to H. C. Moore, E. Lansing, Mich. as soon as convenient. Send in the title now and write the paper later. If you discover later that this year's experimental results do not warrant a paper it will be easy to withdraw your name and title of your paper from the program. A large number of brief papers bringing out the important developments in the different phases of the potato in-

dustry will help to make the next meeting the best ever held by our association.

Your secretary requests that copies of all papers accompanied by abstracts be in his hands by the first of December. There is much to be gained by this accomplishment. In the past some have talked from mere outlines and wrote up their papers later sending them in perhaps during the middle of February or the first of March for publication in the Annual Report. This holds up the publishing of the papers which are then turned over to the printer at a very busy season. For example this year the papers of the Potato Association of America were given to the printer within a short time after he had received those from Horticultural Science and perhaps many other reports from similar organization and you know the results. Delays in publishing the papers detract value from them. The papers for the coming report should be corrected before the Annual Meeting and the corrections taken up with the authors at the meeting. This will permit bids to be secured for printing the Annual Report and the selling of advertising space before the meeting. Your cooperation will help you to receive a copy of the Proceedings of the next meeting by St. Valentine's Day.

NEW MEMBERS

No. of New Members	Obtained by
1	W. K. McCullough, Nova Scotia.
1	J. E. Murphy, P. E. Island.
3	A. G. Tolaas, St. Paul, Minn.
5	E. B. Tussing, Columbus, Ohio.
23	C. W. Waid, Columbus, Ohio.
9	E. M. Page, Columbia, Mo.
2	B. A. Brown, Storrs, Conn.
6	M. Hull, Baton Rouge, La.
1	J. Bushnell, Wooster, Ohio.
2	J. S. Gardner, Lexington, Ky.
1	T. W. Strachan, Letcher, S. D.
1	H. M. Cunningham, Patten, Me.
1	R. G. Risser, Calif.
6	H. H. Zimmerley, Norfolk, Va.
2	H. L. Bailey, Bradford, Vt.
1	L. D. Sweet, Denver, Colo.
4	H. M. McCrary, E. Lansing, Mich.
1	O. C. Hicks, New Brunswick, Canada.
2	J. F. Woolf, Greeley, Colorado.

Membership Standing of the States in the Potato Association of America on Basis of Production

The figures in the table below are interesting and undoubtedly will be puzzling to a large number to know why such great dif-

ferences occur in membership of adjoining states. A geographical reason will not answer the question in reference to distant states. The present **ten leading states** are well distributed. The editor has been told by one of the old standbys not to expect much from the South. The states of Louisianna, Florida and New Mexico are truly southern states, the first two are above their quota and the last is on par and likely to go higher. **Montana, ranking at the top of the list** has gone over her allotment more than **three and one-half times** and **Vermont nearly one and one-half times.** These two states along with Michigan and South Dakota represent the North with high memberships. **Nebraska, second from top, Nevada fourth and Connecticut sixth, represent** the intermediate states geographically fairly well from east to west.

The basis for the ranging of the states is calculated on **one member for each 100,000 bushels** of a five year average (1922-1926, U. S. D. A. Yearbook.) The second column in each list gives the

States	Proposed No. of members on basis of 100,000 bu.	No. of listed members	Per cent of present members on proposed basis	States	Proposed No. of members on basis of 100,000 bu.	No. of listed members	Per cent of present members on proposed basis
Mont.	39	142	361.1	Wis.	298	64	21.9
Nebr.	80	171	213.8	Colo.	141	27	19.2
Vt.	33	48	145.5	Mo.	68	13	19.1
Nev.	7	10	142.9	Mass.	27	5	18.5
La.	19	26	136.8	Utah	27	5	18.5
Conn.	26	33	126.5	Wy.	17	3	17.6
Fla.	26	28	107.7	Me.	350	58	16.6
N. M.	2	2	100.0	Tex.	19	3	15.8
Mich.	323	262	81.1	Va.	145	20	13.8
S. D.	59	44	74.6	Md.	37	5	13.5
R. I.	3	2	66.7	Wash.	89	12	13.5
N. D.	117	77	65.8	Idaho	137	17	12.4
Kan.	43	28	65.1	Miss.	10	1	10.0
Del.	7	4	59.1	Okla.	27	2	7.4
N. Y.	343	170	49.6	Ga.	14	1	7.1
Ohio	110	47	42.7	S. C.	30	2	6.7
Ky.	43	17	39.5	Ind.	53	5	9.4
N. J.	94	34	36.2	N. H.	18	1	5.5
Penn.	251	85	33.9	Iowa	76	4	5.3
Calif.	78	26	33.3	Ala.	27	1	3.7
Minn.	272	79	29.0	N. C.	54	1	1.9
W. Va.	48	13	27.1	Ark.	20	0	0
Oregon	54	13	24.1	Ariz.	3	0	0
Ill.	70	16	22.9	Tenn.	26	0	0

present membership and the first columns the quota for each state on the above basis of one member for each 100,000 bushels and the third columns indicate how many times some states have gone over the mark and how near others are making it.

In November the list will be arranged solely **on paid up membership. A member whose dues are not paid will not count towards his state. Every potato grower should boost his own state and the potatoes it raises. Be a booster. It helps you and others too. Boost the Potato Association of America and puts your state at the top.** The Montana growers are **wide awake** and are going to try to keep their state at the top. If you want to start a little rivalry and have some sport out of it too, challenge Prof. F. M. Harrington, Bozeman, Montana, who is the membership chairman for this state for the first place. You may bet him a good cigar or something better that Montana can not stay at the top. Try the same on Prof. H. O. Werner, Agr. Station, Lincoln, Nebraska, and make him work to hold his state at the second place, or with anyone whether he be living in an adjoining state or across the continent from you. It is not even necessary to be acquainted. All of our members are good sports and will pay if they lose.

Every member can help. Do your bit whenever you have an opportunity and don't be afraid to go out of your way sometimes to get a new member. Your neighbors will thank you for getting them to become members after they have received the American Potato Journal. Simply send in their names, addresses, and dues in form of checks, Postal Money Orders, or the cash.

In the October number the Canadian Provinces will have a chance to shine. You will be surprised to see how high they rank. Are you going to let them go ahead of your state?

In studying over the accompanying table the thought occurred to the editor that probably the growers in some states with low rankings know all about potato production, storage and marketing. This can not be true because the potato problems are becoming more complicated every year. In the potato game you either progress or go backwards and you can always find some of both classes regardless where you go. Why? **The day of the rule of thumb is past. The day of the exact application of scientific knowledge gained by persons technically trained in the various phases of potato production, storage and marketing has come. A neglect in what is known to be the best method or the lack of knowledge means reduction in the profits, or loss, or it may spell a total failure.**

The American Potato Journal and the Annual Report contain articles by men who are constantly studying potato problems. These articles are authentic and up-to-the-minute, and not some re-hashed stuff with nothing new in them. No one is paid for writing these articles nor abstracting publications. They are given

by men who put the welfare of the industry foremost and want to do the most for it. Men in other countries are taking an active interest in our publications. It may be an interest to some to know that every month the Journal is mailed to members in ten different countries.

The greatest hold back in the publications of the Potato Association of America today is the lack of sufficient number of members. It does not take the printer any longer to set the type for 100,000 copies than it does for 2,000 copies. Every member is a member of the membership committee during this campaign. Don't fail to do your duty. Help yourself by helping others.

CROP AND MARKET NEWS

CROP REDUCED; BETTER MARKET OUTLOOK

(Contribution from the Fruit and Vegetable Division, Bureau of Agricultural Economics, U. S. Department of Agriculture)

A much better feeling now exists among potato growers and shippers. The market situation reflects more confidence, following the reduction in the crop report, and part of the "scare" which prevailed a few weeks ago has been dissipated. No longer is there the feeling that production of potatoes will be greater than markets can readily absorb.

Weather conditions and crop prospects in some of the leading States are summarized as follows: Since August 1, the Maine production forecast has been reduced by 5,500,000 bushels. Wet sultry weather resulted in serious damage from blight. The Green Mountain variety, representing 75% of the acreage, had just finished blossoming when the blight set in, and the crop has gone down rapidly. Irish Cobblers, representing 25% of the acreage, have shown good yields. Early shipments contained much stock of inferior quality and condition. Arrivals on the Boston market seemed to become worse instead of better, and some worthless stock was dumped. A few cars inspected there showed as much as 50% decay. There is hope, however, that later shipments will show better condition. Prices so far have been moderate, and future prices depend largely on whether or not the Maine crop improves.

Growers in New York State expect a normal crop. Continued rainy weather during late August was none too good for the tubers, but little actual damage had been reported. In fact, the total estimated production for New York was increased slightly by September 1. Some fields in Pennsylvania, which had not received careful attention with respect to spraying, were showing considerable blight, but, on the whole, a crop of good quality is expected and a fairly high yield.

Drought hurt the crop in the North Central region, and some sections were affected by frost. Michigan production prospects decreased by 7,000,000 bushels during August. The estimate for Wisconsin was reduced by nearly 4,000,000 bushels, while Minnesota's crop dropped 2,400,000 bushels. This is a combined decrease of 13,000,000 for the three States. Michigan and Wisconsin now expect fewer potatoes than last year, and so does Maine. Yields from early diggings in Michigan were very light.

Blight has caused considerable trouble in Utah, but prospects improved somewhat in Colorado, Montana and Idaho. The Pacific Northwest in general expects a heavy crop of excellent quality, though production still is subject to weather conditions. Local estimates indicate possibly 12,000 cars of potatoes from Washington alone. Yields in the Delta region of California have been far below those of last season, and the moderate price of $1.25 per 100 pounds, f. o. b. river bank, prevailed in early September. Washed potatoes were bringing a premium of 15c-25c per 100 pounds over other packs, in San Francisco, and large selected Lakers were selling as high as $2.10.

The National Situation

For the country as a whole, about 400,000,000 bushels of potatoes are estimated, according to September 1 condition. This is 11,000,000 less than in August but still is heavier than the rather light crops of the last two years. The 1926 outturn was estimated at 356,000,000 bushels and the great crop of 1924 at 422,000,000. Combined condition of the crop in September was nearly 78½ of normal, or 1 point above the ten-year average. Production may be 5,500,000 bushels above the five-year average, 1922-1926.

A writer in a leading financial paper has compiled some interesting figures and has drawn some striking conclusions. He estimates that, as a rule, about 30% of the total potato crop must be deducted for seed, for culls, and for losses through waste, decay and shrinkage. This leaves 70% for human consumption, which would mean 280,000,000 bushels, according to the September report. The same writer claims that the average per-capita consumption of potatoes in recent years has been two and two-thirds bushels. Even if that estimate were reduced to two and one-half bushels, it would mean that nearly 300,000,000 bushels are needed this season to satisfy normal eating requirements. So that, instead of having an overabundance of potatoes, as was first expected, it now looks as if there will be ample conumptive capacity for every available spud,—and then somebody may have his normal ration reduced.

National carlot shipments have been fluctuating recently, in accord with the weather. Some of the principal producing districts, usually supplying the late summer market, have been visited by frequent periods of rain. Digging was stopped temporarily and

shipments dropped. Later, shipments would be actively resumed and the carlot movement at once increased However average weekly output for August was around 4,000 cars, or 400 more than during the same month last season. Minnesota, Nebraska and Wyoming, by September 3, had exceeded last year's corresponding record; Maine's output was almost as heavy as during the early part of the 1926 season, but all other main-crop States were running far behind their 1926 record. In other words, the northern crop generally is later than last year. Minnesota and Wisconsin in the North and Long Island and Maine in the East were the most active section in early September, but movement from New Jersey and Kansas was still fairly heavy.

Prices at Moderate Levels

Market prices are considerably below those of a year ago. The tail-end movement from Kaw Valley was not of such good quality as earlier shipments, and quotations on that stock declined to about $1 per 100 pounds at shipping points. City consuming centers reported these mid-western arrivals at a range of $1.40-$1.85. Eastern Cobblers declined and then advanced, closing at nearly the same level as a month before,—$1.85 at Jersey shipping points and $2.00-$2.65 in terminal markets. The Boston market was weak on inferior Maine stock at $1.50 per 100 pounds sacked, though New York City sales were made at higher prices. General range on Northern Round Whites was $2.00-$2.35.

The Wisconsin f. o. b. market was opening at $1.50, or 50 cents to 75 cents below the corresponding level of last season. Early Ohios from southeastern Minnesota ruled $1.25 at point of origin and $1.40 in Chicago carlot market, but the Chicago price for Wisconsin and Nebraska potatoes was close to $1.85, and early arrivals of Idaho Russet Burbanks brought $2.25. There seemed to be a tendency toward higher prices in most markets. The Western Slope of Colorado reported a general f. o. b. level of $1.15, and some Nebraska Triumphs brought only $1 at shipping point.

Growers in New Jersey are said to have made some money this year, not because of high prices but because of yields averaging (in certain instances) around 200 bushels per acre. Production offset the moderate prices, which sometimes were as low as $2.00 per 150-pound sack. The New Jersey crop was cleaning up during early September. Considerable confidence in the spring potato market is suggested in a recent report of sales of certified seed stock in western Nebraska. Wth increased acreage, prospects were good for a heavy yield. A crop of 400 or 500 cars of certified seed is expected there, and half of these are contracted at prices ranging from $3.00 per 100 pounds at digging time to $3.80 for February delivery.

CERTIFIED SEED POTATOES

Canada.—Approximate acreage of potatoes entered for inspection with a view to certification in 1927—31,720 acres.

Applications	5,567
No. of fields	7,166
Irish Cobblers	21,408
Green Mountains	7,850
Other varieties	2,462

Total acreage entered for inspection in 1926—13,715 acres.—**J. Tucker, Aug. 25.**

Extract from the Fruit and Vegetable Crop Report, No. 3 August 1927, Fruit Branch, Department of Agriculture

Potatoes

An increased acreage is reported in Eastern Canada, the total for the Dominion being 102 per cent compared with the ten-year average; and indications are for an increased production, the estimated yield being 50,644,000 cwt. compared with 48,682,000 in 1926.

Nova Scotia.—Something over 5 per cent increase in acreage is reported, principally in late varieties, and the estimated yield is about 3,500,000 cwt. as compared with 3,115,000 in 1926. All plots comparatively free from insects and disease.

Prince Edward Island.—The acreage is reported as 45,000 acres (25,000 acres early potatoes and 20,000 lates), with an estimated yield of 4,892,000 cwt. as compared with 4,603,000 in 1926.

New Brunswick.—Planting was 45,000 acres as compared with 42,744 in 1926. The weather has been very wet, but 75 per cent of the crop has made good growth, and reports indicate a yield of 5,265,000 cwt.

Quebec.—Quebec has a slightly increased acreage, and the estimated yield is 15,406,000 cwt. compared with 14,676,000 in 1926.

Ontario.—With a total acreage of 152,000 acres present indications are for a yield of 10,518,000 cwt. compared with 9,898,000 cwt. last year. Favorable growing conditions have been experienced in all parts of the province. In **Grey and Simcoe** the acreage is estimated at 500 acres early potatoes and 2,000 acres later varieties, promising a yield equal to 1926. In North Wentworth, Halton, Peel, Dufferin, East Brant and East Wellington 2,000 acres early and 9,000 acres late potatoes are reported.

Prairie Provinces.—Present indications are for 2,254,000 cwt. as compared with 2,308,000 cwt. in 1926. In **Saskatchewan** present indications are for 3,687,000 cwt. as compared with 3,030,000 cwt. last year. **Alberta** 3,055,000 cwt., compared with 2,967,000 cwt.

British Columbia.—With an increased acreage and favorable growing conditions, the crop is now estimated at 2,216,000 cwt. compared with 1,935,000 in 1926.

Connecticut.—Most of the small unsprayed fields of potatoes in this state are dead or nearly dead at this writing. Aphids, leafhoppers and late blight are all responsible for this condition. Well sprayed fields are standing up nicely and promise a good crop. Markets have been weak for the past two or three weeks but have strengthened somewhat lately Quotations in the six principal cities range from $1.10 to 1.35 per bushel for native stock and from $3.00 to $3.50 per barrel for shipped in potatoes.**—B. A. Brown, August 31.**

Europe.—Drought in Southern Europe and the late spring and excessively wet summer in the North have adversely affected potatoes as well as cereals and sugar beets. The indications are that the European potato crop of 1927 will fall short of the five-year average of 1921-1925 by around six million tons, or 200,000,000 bushels.**—H. B. Smith, Special Representative, U. S. Department of Commerce, Aug. 4, 1927.**

Minnesota.—The Minnesota State Potato Tour, held from August 2nd to 4th and passing thru Clay, western Polk and Hahnomen Counties, was without question the most successful tour we have ever had, both from the standpoint of attendance and interest shown by those who attended. A number of potato dealers interested in good seed stock made the complete tour.

Problems of disease and insect control, fertilizers, cultivation, planting, seed potato certification, and storage were the chief topics discussed.

One of the interesting features of the tour was a demonstration of tuber unit planting versus ordinary planting on a field of Bliss Triumphs being grown for certification by Ed. Askegaard of Comstock, Minnesota. The tuber unit planting was done by an automatic cutter and planter. This machine has now been used for two years by Mr. Askegaard and has proved very successful, especially with reference to the ease with which undesirable plants can be recognized in the field. A great deal of interest was manifested by the tourists in this planter, which was displayed and the workings of which were explained by the manager of the company manufacturing the machine.

A number of Irish Cobbler fields planted with the best seed stock available on Prince Edward Island and imported into Minnesota by one of the largest potato firms doing business in the state, for distribution among growers for foundation stock, were also visited. One of our serious problems in the certification of seed potatoes, especially Irish Cobblers, is the spindle tuber disease, and we are very much interested in the outcome of the Prince Edward Island stock with reference to this trouble. It s a lamentable fact that most of the Prince Edward Island stock was stored under unfavorable conditions and this, coupled with the fact that planting was delayed from three to five weeks, caused excessive sprouting.

It seems that the removal of these sprouts caused enough injury to the seed pieces so that considerable seed piece rotting took place in the soil.

Several fields of Bliss Triumphs containing from 60 to 100 per cent Mosaic were visited as a contrast to other fields being grown from tuber indexed and hill selected stock.

Of especial interest to the visitors who were on the tour in Clay County was the stop made at the farm of Levi Thortvedt near Moorhead. Mr. Thortvedt and his son have invented a digger attachment for the Fordson and McCormick-Deering tractors that has proven particularly successful in the heavy gumbo soils of the Red River Valley.

At East Grand Forks the farm of C. A. Larkin was visited and a demonstration of the International Harvester Company's Farmall tractor given. Practically all of the operations on Mr. Larkin's 150 acre potato field, except spraying, are done by this tractor. Such a tractor is also being used on the P. A. Rogalski farm at Mahnomen, which was visited on the third day of the tour. Demontsrations of various seed treatments, various combinations of fertilizers, sources of seed stock, and high pressure spraying on the J. P. Kennedy Farm at East Grand Forks were explained by F. S. Pratt, who conducted the tour in Polk County. Some excellent fields of potatoes being grown for certification on what is known as Minnesota Point, one of the most fertile regions of the Red River Valley, were visited. One of the outstanding features of the day spent in Polk County was a visit to the farm of Ole Flaat, one of the biggest certified seed growers in the state. Mr. Flaat has two seed plots, one consisting of individual tuber units and the other consisting of hill units grown from tuber unit stock which has met the requirements set by Mr. Flaat. Other growers are beginning to do similar work, all of which will help greatly in improving Minnesota certified seed stock.

The following day was spent in visiting a number of fields of potatoes being grown on the Schermerhorn Farms. The Schermerhorn Farms, consisting of seven farms, comprise about 30,000 acres, each being run by a farm manager. These farms are largely devoted to the raising of beef cattle and hogs, but a considerable acreage is devoted to the raising of certified seed potatoes. Mr. Robinson, the general manager, has been working to produce high class seed stock and the various fields visited indicate that he is making rapid progress. One of the most interesting fields visited in Mahnomen County was that being grown by Fred Westphal. Mr. Westphal has a 19-acre field of Russet Burbanks, checkrowed and planted by hand. He described his method of planting and pointed out that if the work was properly organized planting such a large field by hand was not particulary hard work. Another fact brought out by this method of planting was the ease with which diseased plants could be detected in the field.

The interest displayed in the various potato problems by all those present was gratifying to those in charge of the tour and indicates that the work which we are attempting is proving a stimulus to better potato production among Minnesota potato growers.—**A. G. Tolaas, Aug. 15.**

Nebraska.—The annual western Nebraska potato tour was held on August 9 to 12. It was well attended by commercial interests representing railroads, cold storage houses, machiners concerns and southern dealers and growers, the latter from the gulf coast states. The tour was planned principally for the purpose of giving the out of state visitors a very comprehensive view of the seed potato certification work being conducted in western Nebraska.

The tour covered practically the entire seed potato producing district with considerable time spent in Sheridan, Dawes, Sioux, Box Butte and Kimball counties. The visitors were all impressed with the fine appearance of most of the fields inspected and the thoroughness with which the disease factor is being handled by the growers in these seed fields. The seed certification work in Nebraska is unique when compared with the work done in most states. In western Nebraska the work is administered by the growers who hire inspectors recommended by the Agricultural College. These inspectors follow standards recommended by the College. The growers thru their organization pay all expenses connected with the work. This plan seems to have many advantages not found in the system of state department or Agricultural College control. This growers organization serves also as a marketing association. It controls the disposition of all certified seed stock.

The value of building a certification program upon a quality standard regardless of consequences to volume of production is manifested in Nebraska this year. During the last few years the demand for Nebraska certified seed has been in excess of the supply. This year the supply will be considerable greater than usual but the demand continues to be very heavy. By August 1st this year more certified seed potatoes had been contracted for than were produced last year. The prices have been unusually satisfactory to the growers. There is considerable sentiment on the part of the seed potato producers and the regular buyers of certified seed to get down to an annual system of contracting in advance of planting or at least in advance of harvesting. This would remove the element of speculation from the certified seed business and it is generally conceded that the stabilizing influence would result in considerable financial gain to all parties concerned.

The acreage inspected in Nebraska was almost twice as great this year as last year, being almost up to the acreage inspected in 1923, when production had gotten ahead of demand. The rejections may amount to as much as 30 or 40%, due to the fact that many new growers did not heed the advice given and planted

stock of rather uncertain quality. Due to the cold and damp weather prevailing most of the season, mosaic has been very easily seen, more so than any year since 1923. In spite of this fact it has, however, been found necessary to reject very few fields on account of mosaic, this disease apparently having been quite largely eliminated from Nebraska stock several years ago.

Black Leg is a disease which very rarely occurs in western Nebraska and then seldom to a serious extent. This year it has appeared to a serious extent in several fields and as a minor trouble in quite a large number of fields. The almost complete absence of this disease throughout most of the season and in most of the seed stocks, causes those concerned to be very much puzzled to know how the outbreak this year could come about. Rhizoctonia has also been more prevalent and has complicated disease readings in connection with both spindle-tuber and mosaic in some regions. Up to the middle of August wilt was not showing up to a serious extent and the situation with regard to spindle-tuber was not especially serious.

Throughout the tour it was quite evident that considerable progress has been made in getting potato growers to discard their particular lots of seed for some of the more desirable lots which have low disease content. Probably one-third or more of the acreage being inspected this year traces back to two or three lots of seed. As a consequence the stock which will be certified this year is on the whole better than that of previous seasons. Furthermore there is a larger quantity of good seed available for planting next year's crop than has been the case in the past.

The Agricultural College in connection with the Nebraska Certified Potato Growers Cooperative is developing pure lines of seed stock that will be practically free from virus diseases (as well as others) by means of the tuber index and isolated seed plat method. In several of the larger plats this year it was impossible to find a single plant that could be recognized as being distinctly diseased with one of the virus diseases. In plats of several acres in extent the index readings last winter indicated a mosaic content of less than 0.2 of 1% and that which was found was a decidedly mild type of mosaic.—**H. O. Werner, Sept. 25.**

POTATO PROSPECTS IN NEW BRUNSWICK

Some apprehension is felt in sections of this Province for the safe harvesting of the potato crop on account of the protracted wet spell of weather.

The Dominion Agricultural crop reporting service has estimated the acreage at 45,000 acres as compared with 42,744 for yast year, and the latest harvest forecast of total yield places the quantity at 5,265,000 cwt. as against 6,090,000 for 1926.

The first inspection on those fields entered for certification was completed during the second week of August. Applications covering 2,512 acres were received from 321 growers.

The distribution of seed fields is quite general: twelve of the fifteen counties comprising the province were represented in the applications for inspection. The counties of Carleton, Restigouche and Westmorland, in the order named, lead all other counties in the acreages grown for certified seed. The Green Mountain variety leads in popularity, with 1,461 acres entered for inspection as compared with the Irish Cobbler variety having 784 acres. Other varieties: Bliss Triumph and Spaulding Rose comprise lesser acreages.—**O. C. Hicks, Aug. 17.**

Wisconsin.—The 1927 Wisconsin potato tour closed on the Radcliffe farm at Eagle River on Friday afternoon, August 19. In many points of interest, the 1927 tour was the most successful ever conducted in Wisconsin. The fields covered by the inspections offered many special conditions and specific object lessons adaptable to field programs and demonstrations. This condition was especially true in regard to potato diseases. Interesting discussions were given on late blight, black leg, rhizoctonia and many other similar problems.

Certain fertilizer demonstrations were located along the line of travel and these proved of unusual interest to the growers and commercial men in attendance. Season conditions have been favorable in Wisconsin to obtain a favorable response with various grades and brands of fertilizers for special soils.

Varying comparative results were noted on insect and disease control by dusting and spraying operations. Careful attention was given to cover fields showing varying results from careless and thorough operations.

Unusual attention was given to the subject of seed treatment by the hot formaldehyde method. Some growers attribute poor stands this year to injury incurred during treating. Careful inquiry discloses that certain mistakes were made. The chief difficulty appears to be in the use of defective thermometers and also in the practice of allowing potatoes to dry in sacks after treatment.

A wide range of interests were represented on the 1927 tour, including mainly growers, shippers, transportation interests, county agents, state and government department men and representatives of the general press and farm journals.

Organized interests in Wisconsin are now centering attention on the state potato show and convention to be held at Rhinelander, November 1 to 4.—**J. G. Milward, Aug. 25.**

REVIEW OF RECENT LITERATURE

THE MAINTENANCE OF PURE AND VIGOROUS STOCKS OF VARIETIES OF THE POTATO

(Revised Edition, 1927)

(Board of Agriculture for Scotland, Edinburgh)

price: one shilling

The present edition is a considerable improvement on the former one and its authors are deserving of great credit for the systematising of information which was formerly presented rather loosely.

British varieties are described in detail, the salient features of each being printed in bold type. Rogues are grouped by reference to characters which are obvious in the growing crop. Uncommon varieties are also described. In the preliminary part the botanical features of the potato are dealt with simply but adequately. The final chapter deals with diseases, particularly virus diseases.

The booklet is very well arranged and comprehensive and can be recommended to all interested in British varieties.—**T McIntosh.**

BUSHNELL, JOHN.—The relation of temperature to growth and respiration in the potato plant.—*Minn. Tech. Bul. 34. (1926)*

A review of the literature shows that summer temperatures thruout much of the United States are too warm for maximum potato yields. The effect of temperature is studied from the growth of plants in glass incubators at 20 degrees to 29 degrees C. No tubers formed at 29 degrees; the best growth was at 20 degrees C. Respiration determinations and carbohydrate analyses disclosed a higher respiration at the higher temperatures but no corresponding increases in photosynthate. The conclusion is reached that the reduction in tuber growth at high temperatures is due to the excessive loss of carbohydrates in respiration.—**The author.**

KOLTERMANN, ALWIN.—Die Keimung der Kartoffelfaule und ihre Beeinflussung durch Krankeiten (The germination of the potato tuber, and diseases influencing it. Translated title).—*Angewandte Botanik, IX, 3; 1927: 290-339.*

A short summary of the author's results is given at the end of this paper, as follows: Fully matured tubers sprout immediately without requiring a dormant period like certain seeds after maturity. A tuber f. i. may be cut off from the stolon at any stage of the development of the plant and caused to germinate. The earlier a tuber is separated from its plant, the more time it needs to ripen and to germinate. On the contrary, the later the tubers are separated from the hill, the shorter the time between digging and full ripening. The time required by tubers attached to the mother plant to reach maturity is longer than that of early dug tubers which ripen prematurely.

The entrance of the sprouting capacity does not necessarily indicate that of the growing capacity; further transformations

within the tuber probably are required to allow the sprouts to develop a plant. The late variety "Prof. Wohltmann" seems to reach its sprouting capacity in November, its complete developing power, however, not earlier than in December. In Germany, therefore, it is usually prematurely dug. By chemical and physical means sprouting as well as continued development may be accelerated.

"Dying off of the tips of sprouts " is not caused by a definite micro-organism, but by environmental factors. A relation to the seed quality of the tubers could not be found, as this disease occurred only in sprouting tests.

Spindle-sprout ("filosity") does not result from definite diseases, but from environmental conditions (unfavorable storage conditions, high temperature etc.) Plants derived from spindle-sprout tubers do not indicate a definite disease, but show merely a scanty growth with production of small tubers that do not reproduce spindle-sprout.

"Little potato" formation in no case occurred as a result of "viroses", but sometimes in consequence of warm storage and of frequent removal of sprouts from the tuber.

Failure of germination in sprouting tests, also, could not be traced back to definite diseases. Therefore it does not disqualify tubers for seed purposes, since plants are developed upon planting.

An influence of leaf roll upon germination could not be established. Tubers of diseased hills produced healthy looking, vigorous as well as weaker sprouts and might reproduce "leaf roll" or not.

An influence of "viroses" upon germination and the sprouts could also not be demonstrated. Tubers from diseased hills formed vigorous, healthy looking sprouts, but the resulting plants were diseased and their tubers in turn produced healthy and vigorous sprouts.

The tubers from plants heavily affected with "curly dwarf" formed thick, but very short, dwarfy sprouts.—**H. W. Wollenweber, Berlin-Dahlem, Germany.**